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SCIENTIFIC ACTIVITIES OF THE TERRESTRIAL SCIENCES LABORATORY
OF THE GEOPHYSICS RESEARCH DIRECTORATE ON FLETCHER'S ICE
ISLAND, T-3

6 June 1957 to 25 September 1957

Robert G. Le Blanc

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Introduction

This memorandum shall describe in brief the progress of the GRD geophysical program on Fletcher's Ice Island T-3 from 7 June to 24 September 1957. The investigators were Mr. Brian Isacks, Lamont Geological Observatory, an AFCRC contractor, and Mr. Robert Le Blanc, Terrestrial Sciences Laboratory, AFCRC.

Mr. John Murray, U. S. Weather Bureau, functioned as scientific leader at Ice Island T-3 for the USNC-IGY Project Ice Skate of which the GRD program is a part. During this period, three other programs were also in progress as part of IGY Project Ice Skate and are briefly mentioned here. The meteorological observations and solar radiation studies were undertaken by Mr. Murray. Six hourly surface synoptic and twice daily pilot balloon observations were supplied to Thule AB in Greenland. Mr. Spencer Apollonio, Woods Hole Oceanographic Institution, continued his studies in marine biology. Sp 1/c William Nash and Sp 2/c Kurt Dickerson, Signal Corps, U. S. Army, were responsible for observations of ionospheric phenomena.

Location of T-3

Vertical angles to the sun were taken with a transit whenever sky conditions permitted. Some tentative values for the location of T-3 are listed on the next page and plotted in Figure 1.

DATE	LATITUDE	LONGITUDE
3 June 1957	82° 50'N	96° 05'W
8 June 1957	82° 48'	97° 09'
11 June 1957	82° 43'	97° 10'
14 June 1957	82° 39'	98° 20'
17 June 1957	82° 33'	100° 00'
21 June 1957	82° 31'	99° 40'
29 June 1957	82° 25'	100° 15'
3 July 1957	82° 20'	101° 05'
7 July 1957	82° 10'	101° 20'
8 July 1957	82° 13'	101° 45'
15 July 1957	82° 03'	101° 50'
5 August 1957	82° 12'	101° 00'
22 August 1957	82° 13'	101° 05'
27 August 1957	82° 17'	99° 10'
1 September 1957	82° 24'	98° 00'
7 September 1957	82° 27'	97° 50'
8 September 1957	82° 23'	98° 20'
13 September 1957	82° 18'	100° 15'
18 September 1957	82° 05'	104° 15'
22 September 1957	81° 58'	104° 25'

Direction to True North

A fixed stake on the island was used for reference and horizontal angles to the sun were measured to obtain direction to true north. An apparent clockwise rotation of 17° degrees was recorded. The rotation was minor throughout most of the summer except during 27 August - 1 September when the island rotated 13° . The longitude change for this period was small.

Direction to Magnetic North

Daily readings of a magnetic compass were taken to determine declination values.

Gravity Measurements

The North American gravity meter was read daily to determine the acceleration of gravity at various island locations.

Bathymetric Studies

A three-directional seismic array on the pack ice was used to obtain ocean depths, dips, and sub-bottom information. Several refraction shots were taken employing a lead 12,100 ft. from the array as shot point.

Three bottom cores were obtained using the Ewing "baby-corer." The longest of these was 41 inches in length. The cores have been forwarded to Lamont Geological Observatory for analysis.

Ice Island Temperatures

Ice temperatures were read weekly from thermocouples in the 30 ft. hole and the 92 ft. hole. Because of the intensive thaw during June and July, the thermocouples previously set at depths of $1/2$ and $2\ 1/2$ ft. melted out. The temperature values are plotted in Figures 2 and 3.

Ablation

Bi-monthly readings of five stakes within a mile and a half radius of camp showed a loss of the snow cover and 20 inches of island ice during the thaw period. Similar studies during the thaw season indicated a loss of up to twelve inches of ice in 1952, no loss in 1953, and about one inch loss in 1955.

Meteorological Observations and Solar Radiation

Surface weather observations were taken every six hours. When sky conditions permitted pibals were released to determine direction and force of upper winds. Studies of solar radiation continued. Technical difficulties prevented albedo measurements along a traverse of the island.

Snow Studies

Temperatures and densities of the snow cover were obtained at four or five levels until late in June when the thaw had removed most of the snow.

Source Area of T-3

Rock specimens were collected in the area around Colby Bay and Five Sisters Hummocks shown in Figure 4. These will be turned over to Dartmouth College for further study and correlation with possible source areas.

Cores

A core on the island between the old campsite and the oceanographic station was started in early July but the corer froze in the hole at a depth of 8 ft. and could be retrieved only at the end of August when it was found to be damaged.


Small Motions of the Island

The use of the North American Gravity Meter permitted recording of the "bobbing" motions of the island. Gravity readings were taken daily at five second intervals over a six minute period. The damage of one bubble level prevented the determination of the island's tilt.

Fauna

Birds were observed at irregular intervals throughout the summer. A number of seals appeared in leads within two miles of the edge of the island. Remains of several fish were recovered from the surface of the island. Also found were small mollusk shells of two or three species and calcified worm tracts.

Mr. Crowley arrived on September 25 to continue the observations until December.



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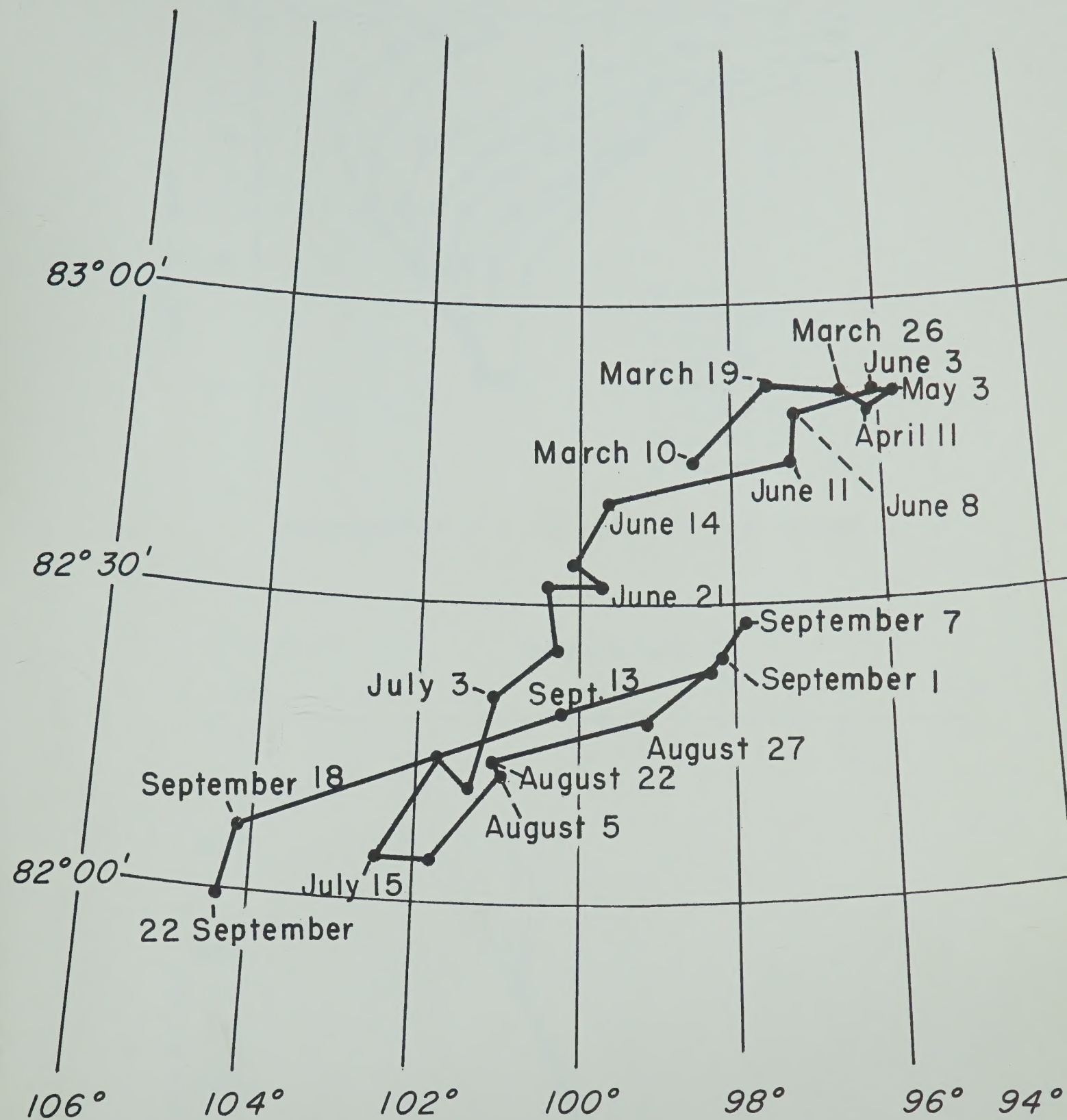
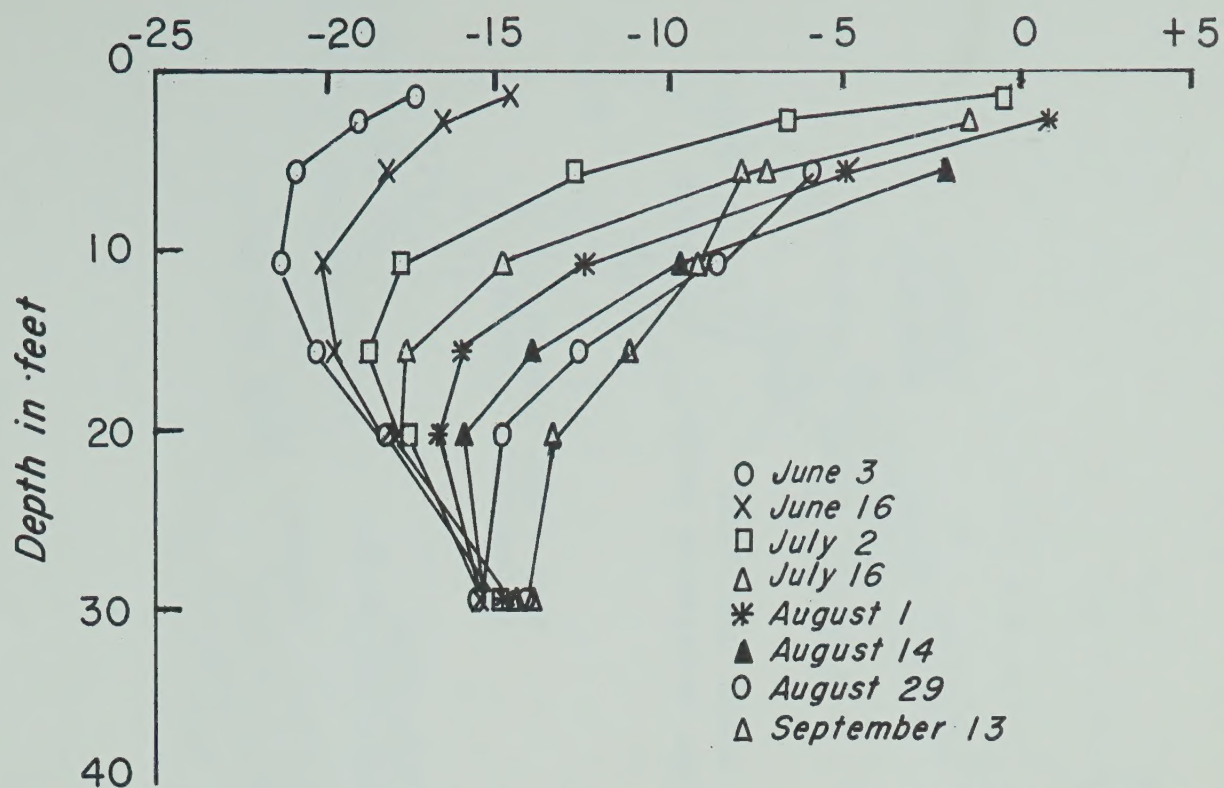


FIGURE 1.

LOCATIONS

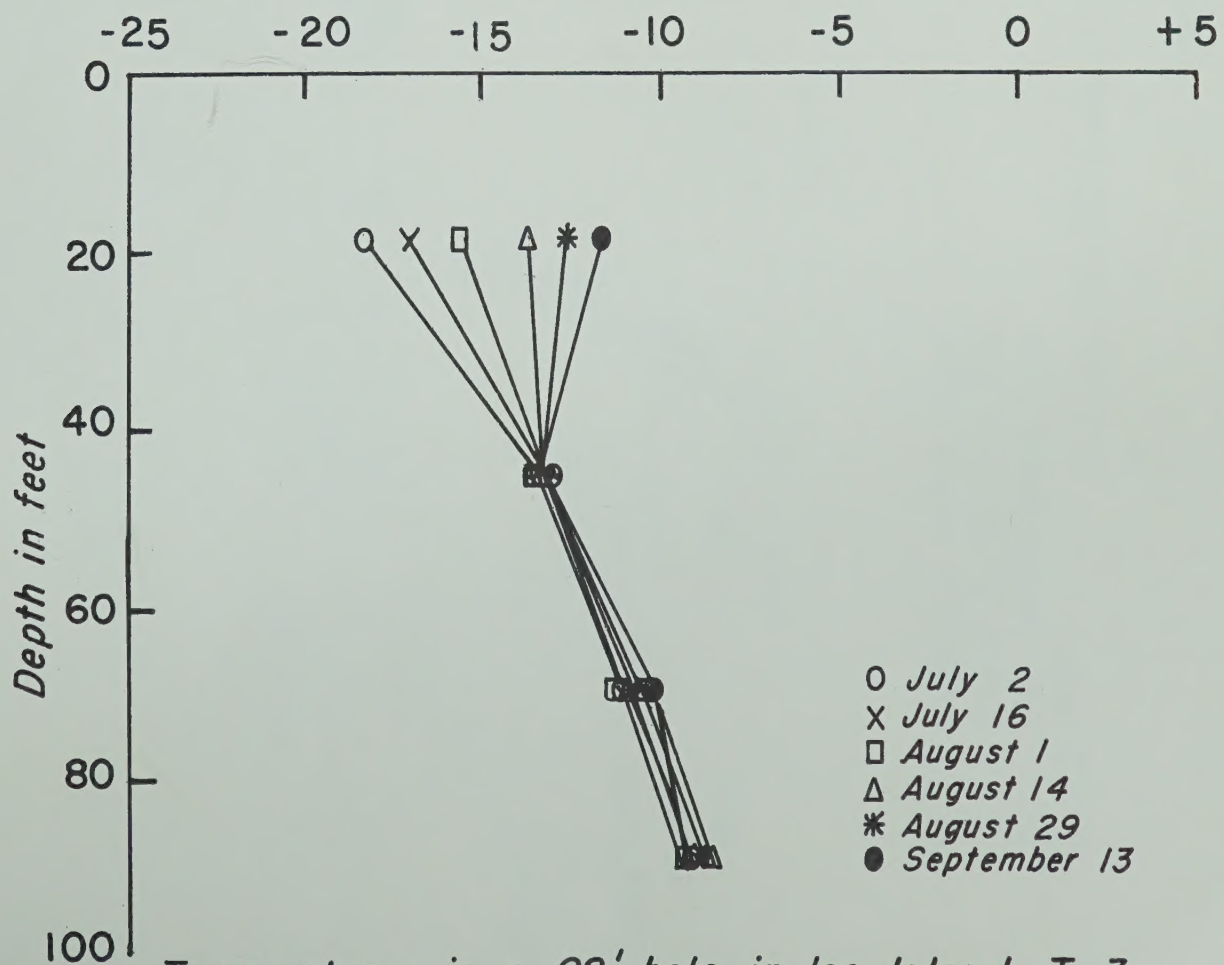
MARCH 10 - SEPTEMBER 22, 1957

Figure 2

Temperature $^{\circ}\text{C}$ 

Temperatures in a 30' hole in Ice Island T-3

Figure 3

Temperature $^{\circ}\text{C}$ 

Temperatures in a 92' hole in Ice Island T-3

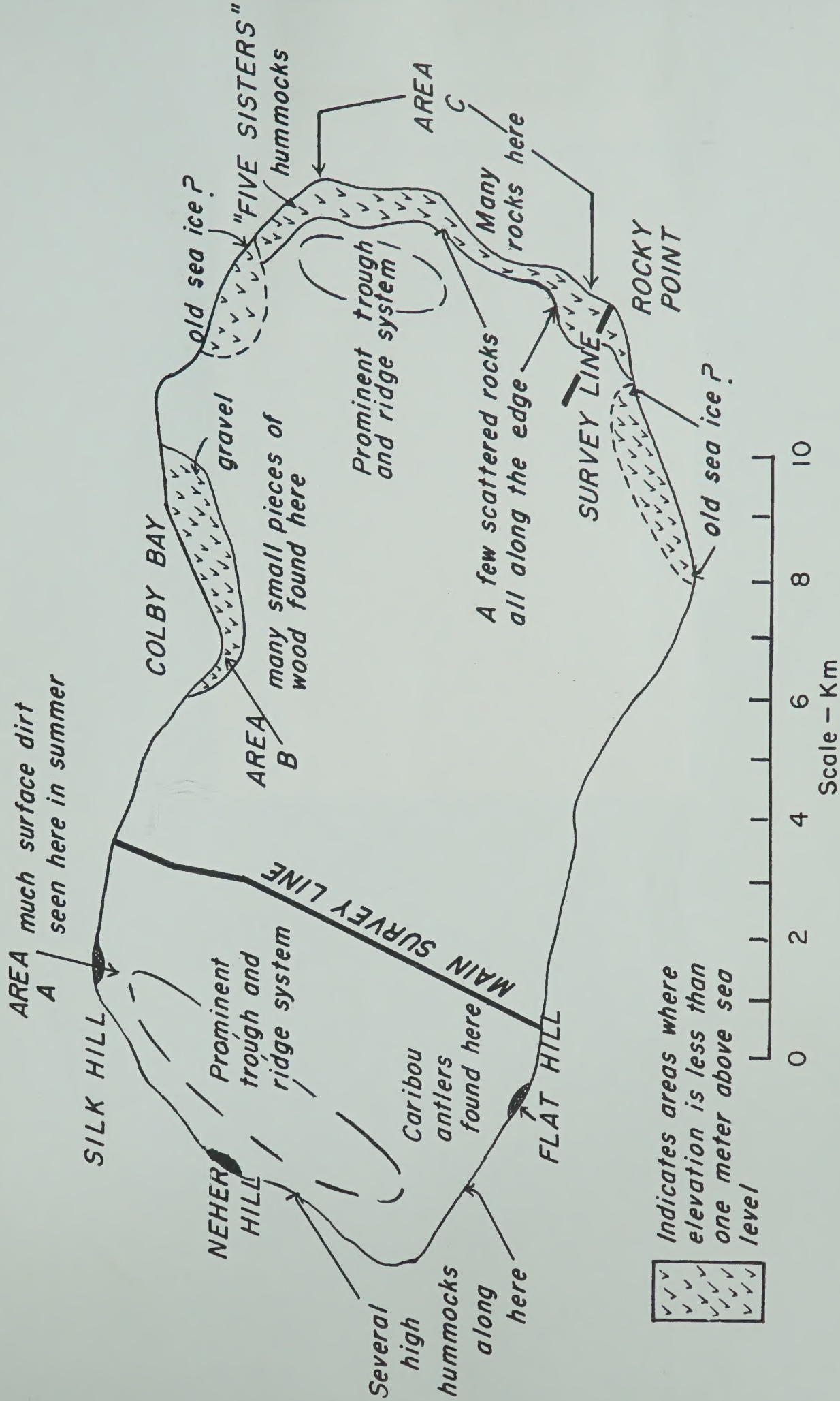


Figure 4

Fletcher's Ice Island, T-3

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